

## CLAIMS

What is claimed is:

1. A method for testing a plasma processing system having a grounded chamber and a bottom electrode, the method comprising:

measuring a first capacitance value between the bottom electrode and the grounded chamber at atmosphere;

installing consumable hardware parts to the chamber;

measuring a second capacitance value between the bottom electrode and the grounded chamber at vacuum, said grounded chamber including said consumable hardware parts; and

comparing said first capacitance value with a first reference value, said second capacitance value with a second reference value, to identify and determine any defects in the plasma processing system, said first and second reference value respectively representative of the capacitance of a defect-free chamber at atmosphere and the capacitance of a defect-free chamber including said consumable hardware parts at vacuum.

2. The method of claim 1 wherein said consumable hardware parts further comprises individual parts, components, hardware assemblies, printed circuit boards, and power supplies.

3. The method of claim 1 further comprising:

measuring each change in capacitance between the bottom electrode and the grounded chamber at vacuum after each consumable hardware part is installed; and

comparing each change in capacitance with a reference value representative of each change in capacitance of a defect-free chamber at vacuum.

4. The method of claim 1 further comprising:

measuring a third capacitance, at atmosphere, between the bottom electrode and the grounded chamber including said consumable hardware parts,

wherein said consumable hardware parts further comprises a chamber lid in an open position.

5. The method of claim 4 further comprising:

measuring a fourth capacitance, at atmosphere, between the bottom electrode and the grounded chamber including said consumable hardware parts,

wherein said consumable hardware parts further comprises a chamber lid in a closed position.

6. The method of claim 1 further comprising:

converting said second capacitance measurement to an impedance measurement;  
and

comparing said impedance measurement with a reference impedance value, said reference impedance value representative of the impedance of a defect-free chamber including said consumable hardware parts at vacuum.

7. The method of claim 1 further comprising:

inspecting said consumable hardware parts when said second capacitance measurement is not within at least about 10% of said second reference value.

8. The method of claim 1 further comprising:

identifying the consumable hardware part causing a deviation of the capacitance measurement from a reference range.

9. An apparatus for testing a plasma etching system having a grounded chamber and a bottom electrode comprising:

a capacitance measurement device coupled to the grounded chamber and the bottom electrode; and

a computer system coupled to said capacitance measurement device.

10. The apparatus of claim 9 wherein said computer system stores a first capacitance measurement value with the grounded chamber at atmosphere, stores a second capacitance measurement value with the grounded chamber including installed consumable hardware parts at vacuum, compares said first capacitance measurement value with a first reference value and said second capacitance measurement value with a second reference value, said first and second reference value respectively representative of the capacitance of a defect-free chamber at atmosphere and the capacitance of a defect-

free chamber including said installed consumable hardware parts at vacuum, and identifies any defects in the plasma etching system.

11. The apparatus of claim 10 wherein said consumable hardware parts further comprises individual parts, components, hardware assemblies, printed circuit boards, and power supplies.

12. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method for testing a plasma processing system having a grounded chamber and a bottom electrode, the method comprising:

measuring a first capacitance value between the bottom electrode and the grounded chamber at atmosphere;

installing consumable hardware parts to the chamber;

measuring a second capacitance value between the bottom electrode and the grounded chamber at vacuum, said grounded chamber including said consumable hardware parts; and

comparing said first capacitance value with a first reference value, said second capacitance value with a second reference value, to identify and determine any defects in the plasma processing system, said first and second reference value respectively representative of the capacitance of a defect-free chamber at atmosphere and the capacitance of a defect-free chamber including said consumable hardware parts at vacuum.

13. The method of claim 12 wherein said consumable hardware parts further comprises individual parts, components, hardware assemblies, printed circuit boards, and power supplies.

14. The method of claim 12 further comprising:  
measuring each change in capacitance between the bottom electrode and the grounded chamber at vacuum after each consumable hardware part is installed; and  
comparing each change in capacitance with a reference value representative of each change in capacitance of a defect-free chamber at vacuum.

15. The method of claim 12 further comprising:  
measuring a third capacitance, at atmosphere, between the bottom electrode and the grounded chamber including said consumable hardware parts,  
wherein said consumable hardware parts further comprises a chamber lid in an open position.

16. The method of claim 15 further comprising:  
measuring a fourth capacitance, at atmosphere, between the bottom electrode and the grounded chamber including said consumable hardware parts,  
wherein said consumable hardware parts further comprises a chamber lid in a closed position.

17. The method of claim 12 further comprising:
- converting said second capacitance measurement to an impedance measurement;
- and
- comparing said impedance measurement with a reference impedance value, said reference impedance value representative of the impedance of a defect-free chamber including said consumable hardware parts at vacuum.
18. The method of claim 12 further comprising:
- inspecting said consumable hardware parts when said second capacitance measurement is not within at least about 10% of said second reference value.
19. The method of claim 12 further comprising:
- identifying the consumable hardware part causing a deviation of the capacitance measurement from a reference range.
20. An apparatus for testing a plasma processing system having a grounded chamber and a bottom electrode, the apparatus comprising:
- means for measuring a first capacitance value between the bottom electrode and the grounded chamber at atmosphere, and a second capacitance value between the bottom electrode and the grounded chamber at vacuum, said grounded chamber at vacuum including at least one installed consumable hardware part;
- means for comparing said first capacitance value with a first reference value, said second capacitance value with a second reference value; and

means for identifying and determining any defects in the plasma processing system, said first and second reference value respectively representative of the capacitance of a defect-free chamber at atmosphere and the capacitance of a defect-free chamber including at least one installed consumable hardware part at vacuum.